



Restoring Crane Habitat Along the Platte River of Nebraska

Beverly J. Weddle

INTRODUCTION

Critical habitat for the migration of endangered whooping cranes and 90% of the world's population of lesser sandhill cranes is found in the Big Bend region of Nebraska's Platte River and the nearby Rainwater Basin. This region is also critical for 7 to 9 million ducks and geese, over 200 other species of migratory birds, and endangered or threatened plant, clam and fish species (Johnsgard, 1991; Farrar, 1992). The Platte River itself is formed in western Nebraska at the confluence of the North Platte River from Wyoming and the South Platte River of Colorado. Both of these rivers originate from snow melt in the Rocky Mountains. Once formed, the Platte flows over 300 miles eastward and empties into the Missouri River (Hadley et al., 1987). The Big Bend region, located in south central Nebraska near Interstate 80, stretches approximately 80 miles from Lexington to Grand Island.

For many migratory birds, the Big Bend region is like the narrowest part of an hourglass. The widest portions of the hourglass are the wintering and nesting grounds. In spring, coming from New Mexico, Texas, Louisiana and other areas, birds of the Central Flyway converge for several weeks in this small area in Nebraska before flying north to nesting grounds spread across Canada, Alaska and Siberia. Among the bird species dependent on the Big Bend region are migrating whooping and sandhill cranes. Two major areas of concern for these cranes are: 1) the loss of suitable roosting sites in the river due to encroaching vegetation and 2) the loss of a dietary source as wet meadows adjacent to the river are diminished due to agricultural practices. In both cases, the concerns are very politically charged as they involve water and land rights, and are affected by alterations in hydrology. This paper looks at first, the loss of river roosting sites and attempts at restoration or reclamation of those sites. The remainder of the paper will be spent discussing the second concern - that of restoration of wet meadows.

RIVER ROOSTING SITES

The Platte River was once a very broad, shallow braided river characterized by shifting sandbars with little or no woody vegetation within or near the river. The riparian zone was not forested, but rather had extensive wet meadows (Williams, 1978). Cranes fed in the wet meadows and roosted at night on the sandbars in the river. (Johnsgard, 1991). As settlement occurred in Colorado, Wyoming, and Nebraska, so did diversion of water and damming of the river occur, particularly for irrigation and hydroelectric power purposes. With this diversion and damming of water, stream flows and sediment transport decreased significantly in the Platte causing channelization of the river, and growth of woody vegetation that could no longer be eliminated by the once powerful scours

of the streamflow and sand. This growth of woody vegetation on islands in the river decreased roosting sites for cranes as they choose open sandbars for roosting. Alterations in the amount of and timing of flows in the Platte have decreased the once extensive prime crane roosting sites to a few areas at present. Efforts at restoring sites in the river are being made particularly by the National Audubon Society at its Lillian Annette Rowe Sanctuary near Gibbon, NE and The Platte River Whooping Crane Maintenance Trust, Inc. ("the Trust") at Grand Island, NE. The Trust, the result of a 7.5 million dollar settlement in the building of the Grayrocks Dam on the North Platte River in Wyoming, is designated for acquiring, maintaining and improving habitat for the endangered whooping crane and other migratory birds. In efforts to restore roosting sites in the river, bulldozers and other heavy equipment are used to remove trees and woody vegetation on some islands. Prescribed burns are used when feasible. This process of removing woody vegetation can be a difficult, expensive and labor intensive process that does not achieve natural conditions. Once the vegetation is removed, without the critical flows in the river to scour the islands, trees and other woody species are readily re-established. Although debated and controversial, without the critical flows in the river, the hydrology of the crucial wet meadows adjacent to the river is altered (Henszey & Wesche, 1993). Because the successful restoration of crane habitat depends significantly on flows in the Platte River, restoration groups have become deeply involved in the politics of water rights and western water law. At present, long-term re-licensing of Kingsley Dam on the North Platte River in Nebraska is on hold until a settlement can be made between irrigation and hydroelectric interests, and scientists, many agencies and environmentalists who want the timing of the flows in the river to be such as to enhance crane and other wildlife habitat. In the past two years, a basin-wide Memorandum of Agreement among the states of Colorado, Wyoming and Nebraska has been attempted to be worked out regarding instream flows of the Platte and wildlife habitat. Since settlement of the area in the 1800's, dams and diversion projects in Colorado and Wyoming have greatly decreased stream flow, and have altered the timing of those flows into Nebraska. In addition, projects in Nebraska have further altered the Platte River and needed wildlife habitat. The parties involved in the Memorandum of Agreement have been far apart on their expectations and concessions.

WET MEADOW RESTORATION

Historically, cranes fed on tubers of prairie plants and small invertebrates. As the prairies were converted to agricultural fields, the cranes had to change food sources. Waste corn in the agricultural fields now makes up about 90% of the cranes diet. Wet meadows are crucial for providing snails and other invertebrates. These animals are rich in the calcium and protein needed to ensure healthy egg production of the cranes during nesting (Johnsgard, 1991).

Once plentiful, these wet meadows have decreased significantly in number due to draining for agriculture, and encroaching woody vegetation due to decreased stream flows and alterations in hydrology. The National Audubon

Society, at its Lillian Annette Rowe Sanctuary near Gibbon, NE has worked in acquiring and maintaining good crane habitat. Downstream, at Grand Island, NE the Platte River Whooping Crane Maintenance Trust Inc. works to increase the number of, and enhance the quality of, wet meadows for many avian species. To help meet this goal, four sites in the Big Bend region of the Platte River were selected by the Trust for restoration and the progress of these sites is compared to two native wet meadow sites in the area.

NATIVE WET MEADOW SITES:

The ideal native wet meadow site for cranes is Mormon Island, a 800 ha wetland complex where 60,000 to 100,000 cranes and other waterfowl have been observed at one time (Currier, 1995). This site is near Grand Island, NE. [Note, for exact location of each site discussed, see Currier, 1995. Note also, that most of the information below is from Currier (1995) a paper from his presentation at the 1995 Platte River Basin Ecosystem Symposium.] Mormon Island, has been subject to intensive grazing and some unsuccessful attempts at draining portions of the area. The Trust acquired this land in 1981 and implemented a management plan that includes grazing and haying rotations and prescribed burns. This management plan has resulted in greater plant production and diversity than existed with the previous management.

The second native site, Binfield, is a 400 ha wet meadow located near Alda, Nebraska. This somewhat drier site is used for intensive grazing and haying so there is less species diversity than that found at Mormon Island. The Trust purchased a conservation easement in 1982 that specifies no drainage or development of the area. Prescribed burns are carried out to eliminate woody vegetation.

In the summer of 1989, both the Mormon Island and Binfield sites were surveyed along transect lines and percent cover of plant species was estimated. In these native wet meadows, 29 species of grasses, 29 wetland species and 67 forb species were found. Mormon Island had a wetland species cover of 35%, an amount much greater than the Binfield site or the restored sites. (See Currier, 1995 for the plant species lists of each site.)

RESTORATION SITES

Restoration sites range in size from 14 to 130 hectares. One site was not seeded, while two were seeded with grasses only. The remaining site was seeded with a wide diversity of grasses and forbs. Attempts at restoration of hydrology to the four sites ranged from no attempt, to leveling and reshaping the land to allow for slow drainage. A wind generated pump was placed at one site. A more complete description of each restoration site is as follows:

Field - 11 is a 24 ha moderately dry area on Mormon Island that was cropped for forty years, most recently in alfalfa. In 1988, the site was enrolled in a Wildlife Habitat Program under state and private auspices. At that time seeds of big bluestem (*Andropogon gerardii*), little bluestem (*Andropogon scoparius*), indiangrass (*Sorghastrum avenaceum*) and switchgrass (*Panicum virgatum*) were

obtained from a commercial source in eastern NE and drilled into a sorghum stubble. No active seeding of forbs or wetland species was done; no grazing or haying is carried out on the site and no alterations in hydrology were attempted. Field-11 is mowed and experiences an approximately annual prescribed burn.

A 25 ha site near Prosser, Nebraska, Uridil, was tilled for about 20 years, mainly in corn. This site is adjacent to the south channel of the Platte River and can experience short term flooding. The Uridil site is enrolled in the Conservation Reserve Program, and was reseeded with non-local grass seeds drilled into sorghum stubble in 1990. No forb or wetland plant species were seeded and no grazing or haying is carried out. Active management has included a burn in the spring of 1992 and also placement of a wind-generated water pump in hopes of increasing surface water ponding at this moderately dry site.

Across the channel from Uridil is Uridil-2, a 14 ha site that was cropped for the last 20 years, primarily in corn. Previously leveled to allow gravity irrigation, Uridil-2 is part of a U.S. Fish and Wildlife Service funded biodiversity study. A portion of the area was scrapped and reshaped in order to resemble characteristic wet meadow drainage contours. In 1992, seeds (amount unknown) of more than 100 native grasses and forbs that had been collected in the Platte River Valley were spread over sorghum stubble and packed into the soil. Mowing was done in the fall to control woody species. No grazing, haying, or burning was done on this moderately wet site that has experienced over-bank flooding.

Located near Elm Creek, NE is the 130 ha Johns site. This area was formerly part of the river channel but had become riparian forest. Between 1983 and 1986, trees (40 - 50 years old) were cut and removed. A Banvel and 2,4-D mix, applied from ground and air; grazing by wild horses; and burning, were management tools used to limit re-growth of woody vegetation and noxious weeds. An upstream dike diverts water away from the site for irrigation. Some sloughs are present, likely created from seepage beneath the dike. In 1989, dams were built to increase the area of surface water, but in 1995, they were washed out by high water. This site was not seeded.

The above four restoration sites were sampled for plant species diversity and percent cover in the same manner as the native sites. However, Field - 11 was sampled four years after restoration efforts had begun; Uridil - three years; Uridil-2 - one year; and the Johns site, seven years after initiating the restoration. For each site a dominance-diversity curve (Whittaker, 1975) was calculated.

Not surprising, the highest total number of grass, wetland and forb species (116) was found at the native Mormon Island site. Uridil - 2, a restoration site that was heavily seeded, had 105 species while 80 plant species were observed at Binfield, the other native site. The Field 11, Johns, and Uridil sites were observed to have approximately 50, 49 and 30 species, respectively.

The dominance-diversity curves, measuring both species richness and importance, revealed the native sites to be the most diverse and complex (dominance-diversity values of 42.6 and 39.5). The restored sites scored much lower using the dominance-diversity curves, with the Uridil site having the lowest value of 11.4.

The Trust has noted that the percent cover of some plant species may be the same at restored sites as at reference native sites. However, the number of grass, wetland, and forb species is significantly reduced in the restoration sites. (One exception is the Uridil - 2 site that had been heavily seeded.) In all, the restoration sites have not reached the diversity of the native wet meadows. Overall, the restoration sites lacked 63% of the grasses; 78% of wetland species; and 73 % of forb species that were found in the native wet meadows (Currier, 1995).

COMMENTARY:

As pointed out by Currier (1995), caution is in order in interpreting the results, as the restoration sites are only one to seven years old, are much smaller than the native sites, and seeding or planting did not occur at all sites. Furthermore, the hydrology of the original wet meadows was not likely to be found at the restoration sites. Drainage and drawdown for irrigation and development have occurred and the water table is most likely further from the soil surface than it was historically (O'Brien and Currier, 1987). While some efforts were made at pumping at one site, no mention of exploration of the previously cropped sites for tile lines and plugging of tiles was mentioned in Currier (1995). According to project managers, tile lines are not commonly used in the Platte Valley. This is in contrast to other parts of the midwest, especially Minnesota and Iowa, where breaking or plugging of tile lines is often necessary for successful wetland restorations. The goals of these restorations have been to restore, for the greater than 10 million migratory birds that need this area, a small portion of the extensive wet meadows that once spread across the Platte River Valley; to re-establish the diversity of native grass, wetland, and forb species in these wet meadows; and to re-establish a functioning wet meadow with the invertebrate and vertebrate species needed by cranes and other birds. While there is information available on the amount these wet meadows are used by birds (Savidge and Siebert, 1992), more documentation is needed. Current efforts are being carried out to sample the number and diversity of food sources (invertebrates) for cranes in the wet meadows (Savidge, 1996).

Monitoring of the restoration sites is not as intensive as would be ideal. Depending on the site, a plant survey was done one to seven years after the restoration was begun. The use of volunteers to monitor these restoration sites may be an option given the limited time available to the staff of the Trust. Colleges in the Big Bend region, native plant societies or similar organizations are sources of volunteers to survey plant, bird and invertebrates species.

Overall, seeding of grasses at the restoration sites can be successful, however the hope that the native species would out-compete introduced ones has not been realized as of yet. The seeding of forbs, at the Uridil-2 site, proved to be beneficial in increasing forb species dramatically. No wetland species were planted at the restoration sites and recovery of wetland species was poor, except at the Johns site. This site had been manipulated to increase surface water levels. The alteration in hydrology, that has occurred in the last 100 years, is considered the main reason for the lack of re-establishment of wetland plants in the

restoration sites or other wet meadows (Currier, 1995). Current Political Issues:

Alterations in hydrology of wet meadows and instream flows of the Platte River are two very politically charged topics. This May, 1996 the Nebraska Game and Parks Commission ("the Commission") will again consider the issue of an application for an instream flow right in the Platte River to enhance wildlife habitat in the river and the adjacent wet meadows. This application has proved to be controversial as irrigators and water developers indicated that legal action would occur if the Commission persisted in its request for a specific instream flow amount and regime. A "compromise" was worked out with the Commission, irrigators and other water developers for less instream flow in the river and for study two wet meadow sites. This "compromise" has been viewed by many scientists, biologists and environmentalists as inadequate to maintain flows in the Platte and sustain the hydrology of the wet meadows for crane habitat. Meanwhile, a Memorandum of Agreement among Colorado, Wyoming and Nebraska has not been reached, and a lawsuit (Nebraska v. Wyoming) over instream flows in the Platte River continues in this battle where there are no clear-cut "good guys" or "bad guys".

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